

# (12) UK Patent Application (19) GB (11) 2 112 290 A

(21) Application No 8138985  
(22) Date of filing 24 Dec 1981  
(43) Application published  
20 Jul 1983

(51) INT CL<sup>3</sup>  
A63B 66/12  
(52) Domestic classification  
A6D 11G

(56) Documents cited

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(58) Field of search  
A6D

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## (54) Throwing devices

(57) In order to enable a projectile, such as a ball, to be thrown accurately over a considerable distance, the projectile is placed within a hollow tube 3, having one end closed off by a wall 4, mounted on the end of a shaft 1, the projectile being retained within the tube 3 by a resilient flap 7. The shaft 1 is then grasped at the end

remote from the head 2 and swung in a circular arc in the direction of the arrow 8, with the result that the projectile is released from the open end 5 of the tube 3 and travels on a trajectory away from the head 4. The head 2 may take other forms. For example, it may be constituted by two jaws between which the projectile is held prior to being released, or by a curved tubular enclosure which is open at one end.

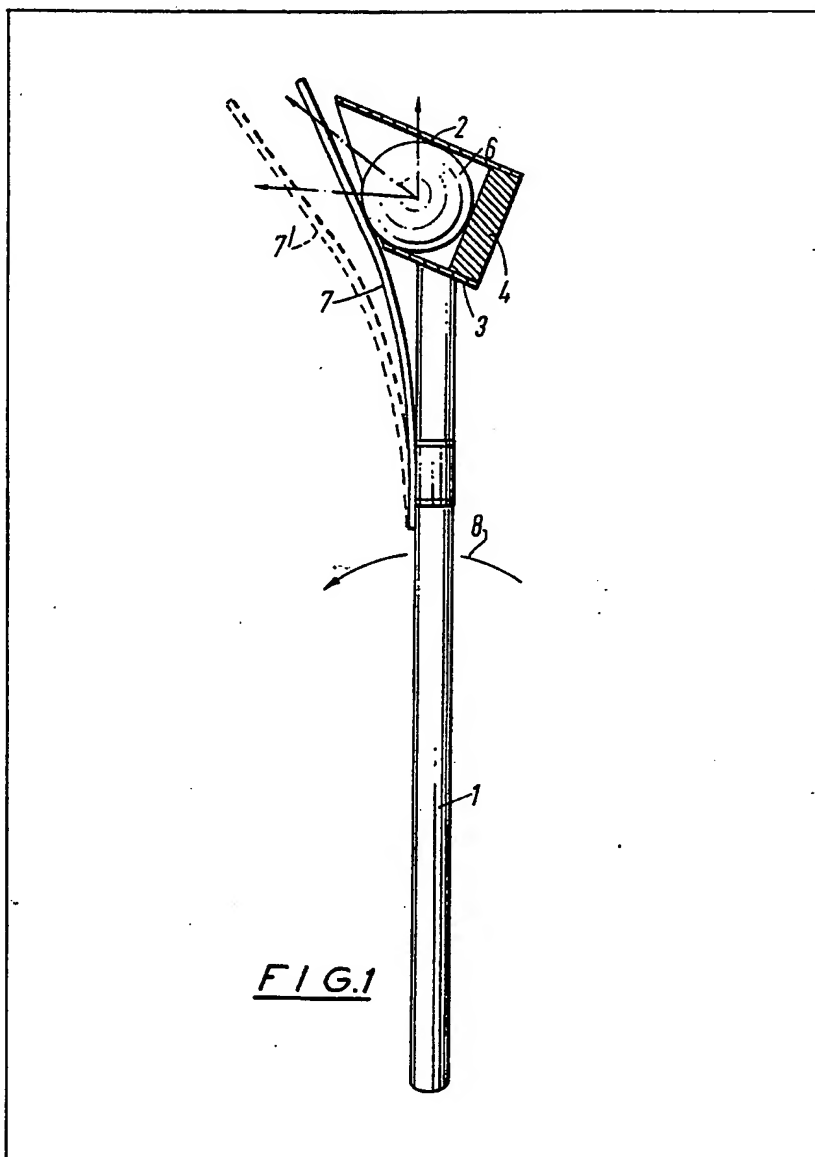


FIG. 1

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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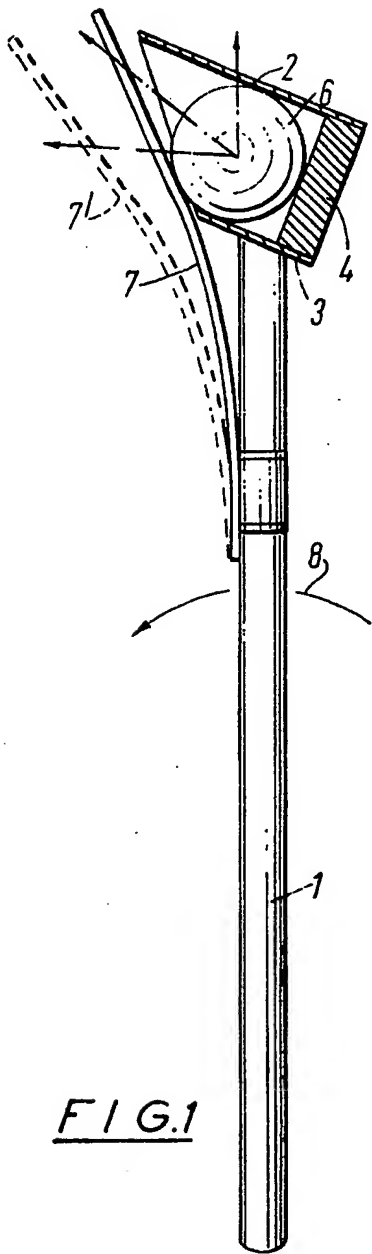


FIG. 1

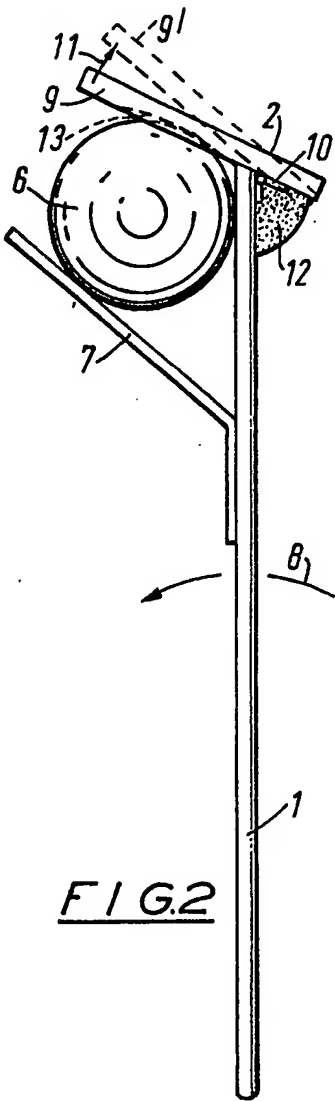


FIG. 2

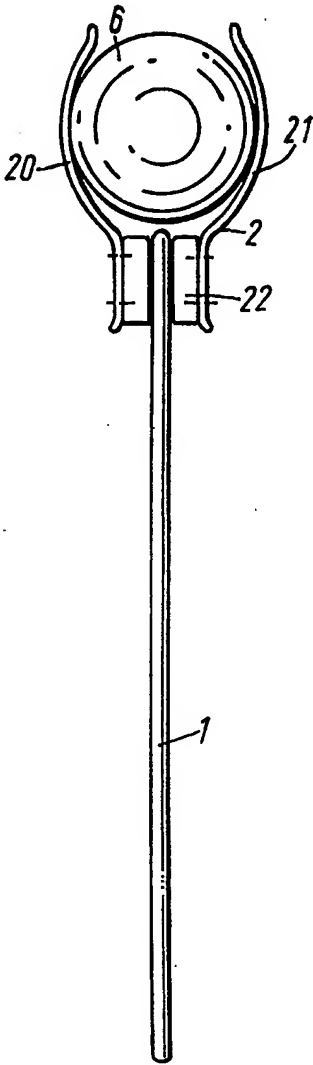


FIG. 3

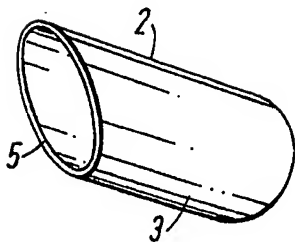


FIG. 1a

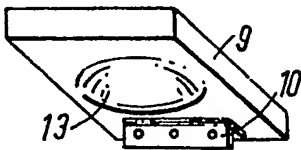


FIG. 2a

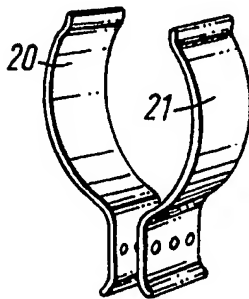
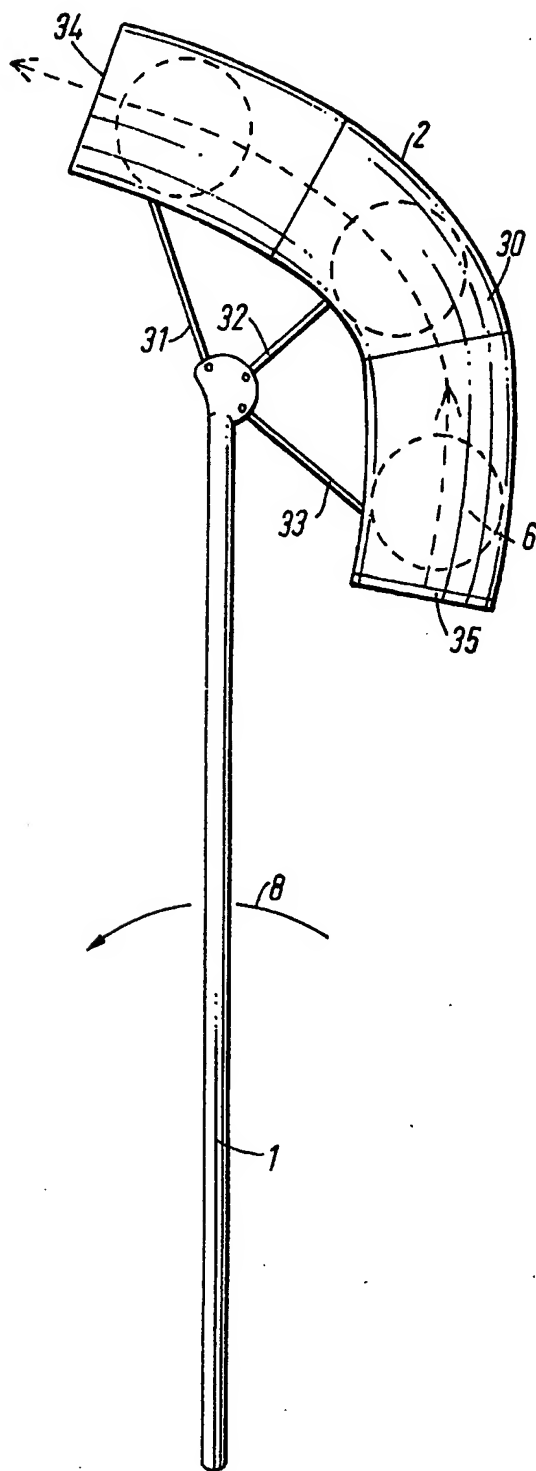
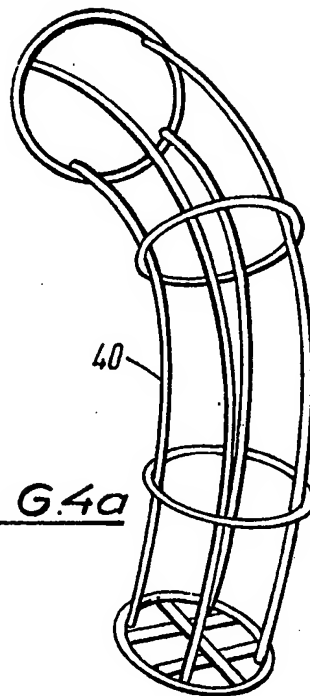


FIG. 3a

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FIG. 4FIG. 4a

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# **SPECIFICATION** **Throwing devices**

This invention relates to devices for throwing projectiles.

- 5 The distance over which a ball or other object may be thrown by a person without the use of any type of throwing aid is limited by the length of the human arm. The present invention has as its object to provide a throwing device which may be used to increase the length and accuracy of throw. Such a device is applicable to competitive sports and other leisure activities, such as the throwing of a ball for retrieval by a dog.

- According to the invention there is provided a device for throwing a projectile, comprising a shaft and a head incorporating retaining means for holding the projectile at one end of the shaft in such a manner that, when the device is grasped by the opposite end of the shaft and swung through an arc with the appropriate angular acceleration, the projectile will be released from the retaining means at a particular point in the swing when the force acting on the projectile and/or part of the retaining means is sufficient to overcome the force serving to retain the projectile within the retaining means and will travel on a trajectory away from the head.

- Since the device effectively serves as an extension of the thrower's arm, it enables objects to be thrown considerably further than they could be thrown by the thrower without the use of the implement. The device is designed or adjusted to release the projectile at a particular point in the swing which enables the projectile to travel over a suitable trajectory and in the desired direction, for a particular method of use. Preferably the release mechanism operates by the projectile overcoming a spring force or a friction force or moving up an inclined surface serving to hold it within the retaining means.

- In one embodiment of the invention the retaining means consists of an enclosure for the projectile having an opening through which the projectile is normally prevented from escaping by a sprung flap but through which the projectile may pass when the force exerted by the projectile on the flap and/or the force acting on the flap by virtue of the swing is sufficient to overcome the spring force serving to retain the flap in the closed position.

- In another embodiment of the invention the retaining means consists of two jaws between which the projectile is normally retained by friction and/or a spring force acting on one or both of the jaws but from which the projectile may escape when the forces exerted by the projectile on the jaws, and/or the forces acting on the jaws, by virtue of the swing are sufficient to overcome the friction and/or spring force serving to retain the projectile between the jaws.

- In a third embodiment of the invention the retaining means consists of a tubular enclosure which is closed at one end and open at the other end, the projectile normally being retained at the

- 65 closed end of the enclosure when the device is in its throwing position, but being capable of climbing an inclined surface towards the open end of the enclosure when the force exerted on the projectile by the swing is sufficient to overcome the forces serving to retain the projectile within the enclosure.

- In order that the invention may be more fully understood, several examples of throwing device in accordance with the invention will now be described with reference to the accompanying drawings, in which:

- Figure 1 is a side view of a first example with the head shown in section;

- Figure 1a is a perspective view of the head of the first example;

- Figure 2 is a side view of a second example;

- Figure 2a is a perspective view of the head of the second example;

- Figure 3 is a front view of a third example;

- Figure 3a is a perspective view of the head of the third example;

- Figure 4 is a side view of a fourth example; and Figure 4a is a perspective view of an alternative head for the fourth example.

- Referring to Figures 1 and 1a, the first example comprises a solid or hollow shaft 1 and a head 2 constituted by a hollow tube 3 having one end closed off by a circular end wall 4 and the other end 5 bevelled at approximately 45° to the axis of the tube 3. The head 2 is mounted on the end of the shaft 1 so that the axis of the tube 3 is upwardly tilted with respect to the normal to the shaft 1, for example at an angle of approximately 30°. A ball 6 may be retained within the tube 3 by a resilient flap 7 which has one end attached to the shaft 1 and is biased into a position in which it obstructs the bevelled open end 5 of the tube 3 and prevents the ball 6 from escaping. The device is made of wood, polythene or other plastics material, or metal, or a combination of these.

- In use the shaft 1 is grasped at the end remote from the head 2 and swung in a circular arc in the direction of the arrow 8 with the angular movement initially being rapidly accelerated. As a result the angular velocity imparted to the ball 6, and hence the centrifugal force acting on the ball, is rapidly increased, thus causing the ball 6 to exert an increasing force on the flap 7, partly due to the angular momentum of the ball 6 and partly due to the centrifugal force. When the force reaches a level at which it is capable of overcoming the spring force serving to retain the flap 7 in the closed position, the flap 7 will move to its open position 7', thus releasing the ball from the open end 5 of the tube 3 and enabling the ball to travel on a trajectory away from the head 2.

- In the alternative construction shown in Figures 2 and 2a, the head 2 comprises a jaw 9 mounted on a bevelled end of the shaft 1 by a hinge 10 so as to be pivotal in the direction of the arrow 11 against a spring force exerted by a wedge 12 of resilient material, such as foam rubber, into an open position 9'. The jaw 9 is provided with a shallow recess 13 in its lower surface for engaging

with the outer surface of the ball 6 when the jaw 9 is in its closed position. The resilient flap 7 serves as a second jaw which co-operates with the first jaw 9 to retain the ball 6 therebetween.

- 5 This construction functions in a similar manner to the example of Figures 1 and 1a. As the angular movement of the device is accelerated, the ball 6 exerts an increasing force on the jaw 2 and the flap 7 until a level is reached at which the jaws 9 and flap 7 are forced open and the ball is released from the device. The spring forces biasing the jaw 9 and flap 7 into the closed positions may be adjusted to suit the desired throwing force or trajectory. It would even be possible for one of the jaws to be rigidly fixed to the shaft and to be made of a material which will not flex to any substantial extent in use.

- Figures 3 and 3a show a construction in which the head 2 comprises two curved resilient metal strips 20 and 21 which are connected to diametrically opposite sides of a collar 22 attached to one end of the shaft 1. The ball 6 is frictionally retained between the strips 20 by the spring force due to the inherent resilience of the strips. This spring force is overcome when the device is swung in the manner previously described so as to release the ball 6 at a suitable point in the swing.

- In the example of Figure 4 the head 2 comprises a curved tube 30 which is attached to one end of the shaft 1 by means of three struts 31, 32 and 33 so that, when the shaft 1 is upright, an open end 34 of the tube 30 is above the opposite end of the tube 30 which is closed off by a circular end wall 35. Successive positions of the ball 6 during a throw are shown by broken lines in the figure. Initially, as the device is swung in an arc, the ball 6 moves up the tube 30 against the force of gravity under the effect of the centrifugal force acting on the ball 6, and, when the movement of the device is no longer accelerating, the ball 6 leaves the tube 30 at high velocity. In a modification of this embodiment, the tube 30 is replaced by a tubular cage 40 as shown in Figure 4a.

- It should be understood that the precise theoretical mechanism responsible for release of the ball in the above described examples may be relatively complex and may vary in accordance with the detailed design of the device, for example with the angle at which the ball leaves the device, or with the manner in which the device is used. Thus, in certain applications, the effect of the centrifugal force alone on the ball itself or on parts of the retaining means may provide the necessary release mechanism, whereas, in other applications, the release of the ball may be influenced by other forces.

- Furthermore it is preferred that the device should be used by swinging it through an overarm arc, the device being rapidly accelerated until it reaches its maximum velocity and then being maintained at this velocity until close to the end of its swing. However it is also possible for the device to be swung in a horizontal plane or through an

underarm arc, and for the release of the ball to be assisted by sharply decelerating the device immediately prior to release of the ball.

- In cases where the release mechanism includes a curved tube, as in the construction of Figures 4 and 4a, the curvature of the tube is preferably chosen so that the movement of the ball is proportional to the acceleration. The angle at which the ball leaves the device, and hence the trajectory followed by the ball, may be chosen to suit individual applications.

#### CLAIMS

1. A device for throwing a projectile, comprising a shaft and a head incorporating retaining means for holding the projectile at one end of the shaft in such a manner that, when the device is grasped by the opposite end of the shaft and swung through an arc with the appropriate angular acceleration, the projectile will be released from the retaining means at a particular point in the swing when the force acting on the projectile and/or part of the retaining means is sufficient to overcome the force serving to retain the projectile within the retaining means and will travel on a trajectory away from the head.

2. A device according to Claim 1, wherein the retaining means consists of an enclosure for the projectile having an opening through which the projectile is normally prevented from escaping by a sprung flap but through which the projectile may pass when the force exerted by the projectile on the flap and/or the force acting on the flap by virtue of the swing is sufficient to overcome the spring force serving to retain the flap in the closed position.

3. A device according to Claim 2, wherein the head is in the form of a hollow tube having one end closed off by an end wall.

4. A device according to Claim 2 or 3, wherein the retaining means is in the form of a resilient flap having one end attached to the shaft at a point spaced from said one end of the shaft.

5. A device according to Claim 1, wherein the retaining means consists of two jaws between which the projectile is normally retained by friction and/or a spring force acting on one or both of the jaws but from which the projectile may escape when the forces exerted by the projectile on the jaws, and/or the forces acting on the jaws, by virtue of the swing are sufficient to overcome the friction and/or spring force serving to retain the projectile between the jaws.

6. A device according to Claim 5, wherein one of the jaws is in the form of a resilient flap having one end attached to the shaft at a point spaced from said one end of the shaft.

7. A device according to Claim 5 or 6, wherein one of the jaws is hinged to the end of the shaft so as to be capable of pivoting against a spring force.

8. A device according to Claim 5, 6 or 7, wherein one of the jaws is rigidly fixed to the shaft and is made of a material which does not flex to any substantial extent.

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9. A device according to Claim 5, wherein the jaws are in the form of two resilient strips disposed diametrically opposite one another relative to the axis of the shaft.
- 5 10. A device according to Claim 1, wherein the retaining means consists of a tubular enclosure which is closed at one end and open at the other end, the projectile normally being retained at the closed end of the enclosure when the device is in
- 10 its throwing position, but being capable of climbing an inclined surface towards the open end of the enclosure when the force exerted on the projectile by the swing is sufficient to overcome the forces serving to retain the projectile within the enclosure.
- 15 11. A device for throwing a projectile, substantially as hereinbefore described with reference to Figures 1 and 1a, Figures 2 and 2a, Figures 3 and 3a or Figure 4 optionally as
- 20 modified by Figure 4a of the accompanying drawings.
12. The combination of a device according to any preceding claim and a ball or other suitable projectile.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office  
25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.